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Managing Water in the West

Lower Santa Cruz River Basin Study – Irrigation Demand

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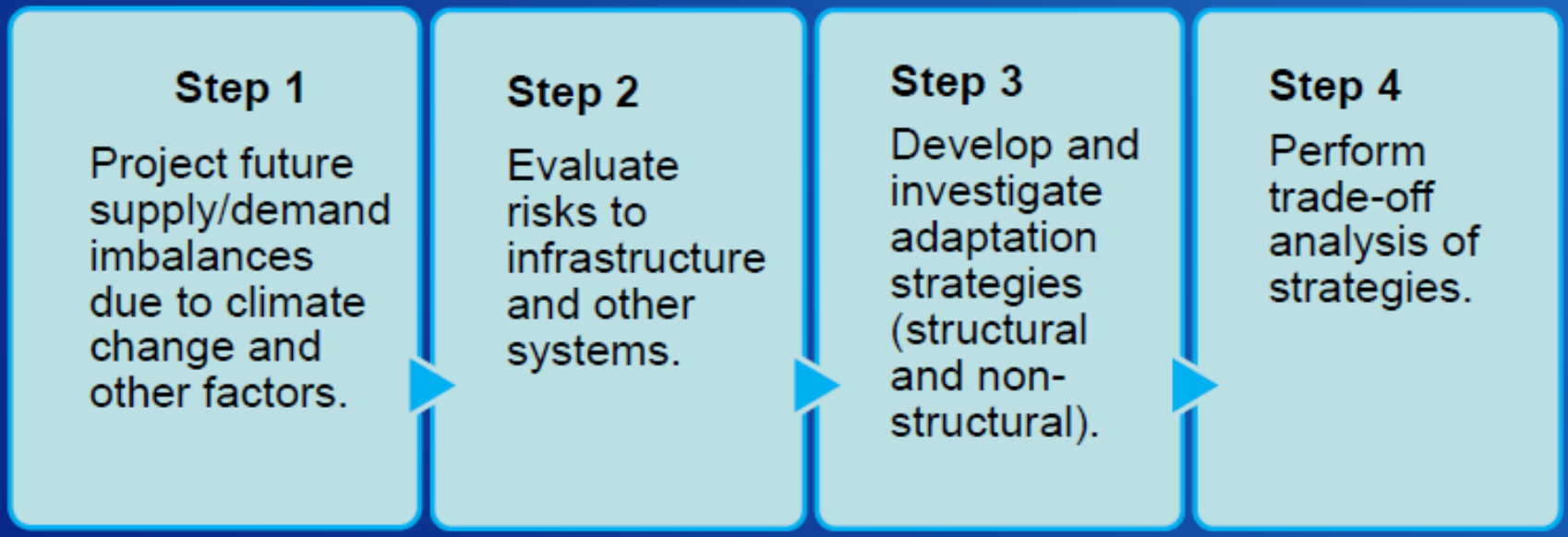
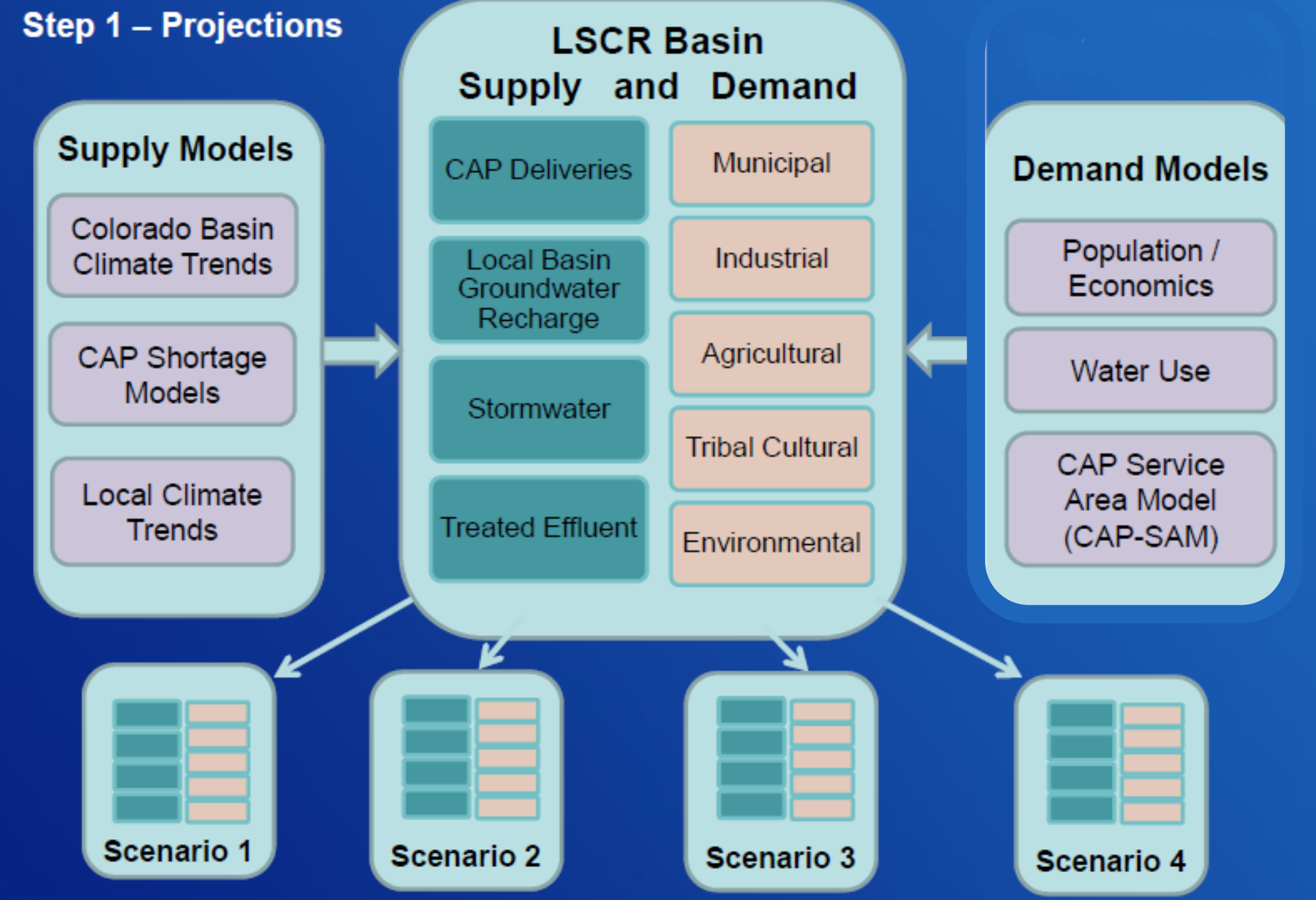
May 20, 2016

U.S. Department of the Interior
Bureau of Reclamation

Overview of LSCR Basin Study Process



Source: Eve Halper, Reclamation, Phoenix, AZ



Source: Eve Halper, Reclamation, Phoenix, AZ

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SECURE Water Act Reporting

- Risks
  - Change in snowpack
  - Groundwater recharge and discharge
  - **Increases in water demand or reservoir evaporation as result of increasing temperature**
- Impacts
  - Ability to deliver water
  - Hydroelectric power generation
  - Recreation at Reclamation facilities
  - Fish and wildlife habitat
  - Endangered, threatened, candidate species
  - Water quality issues
  - Flow dependent ecological resiliency
  - Flood control management

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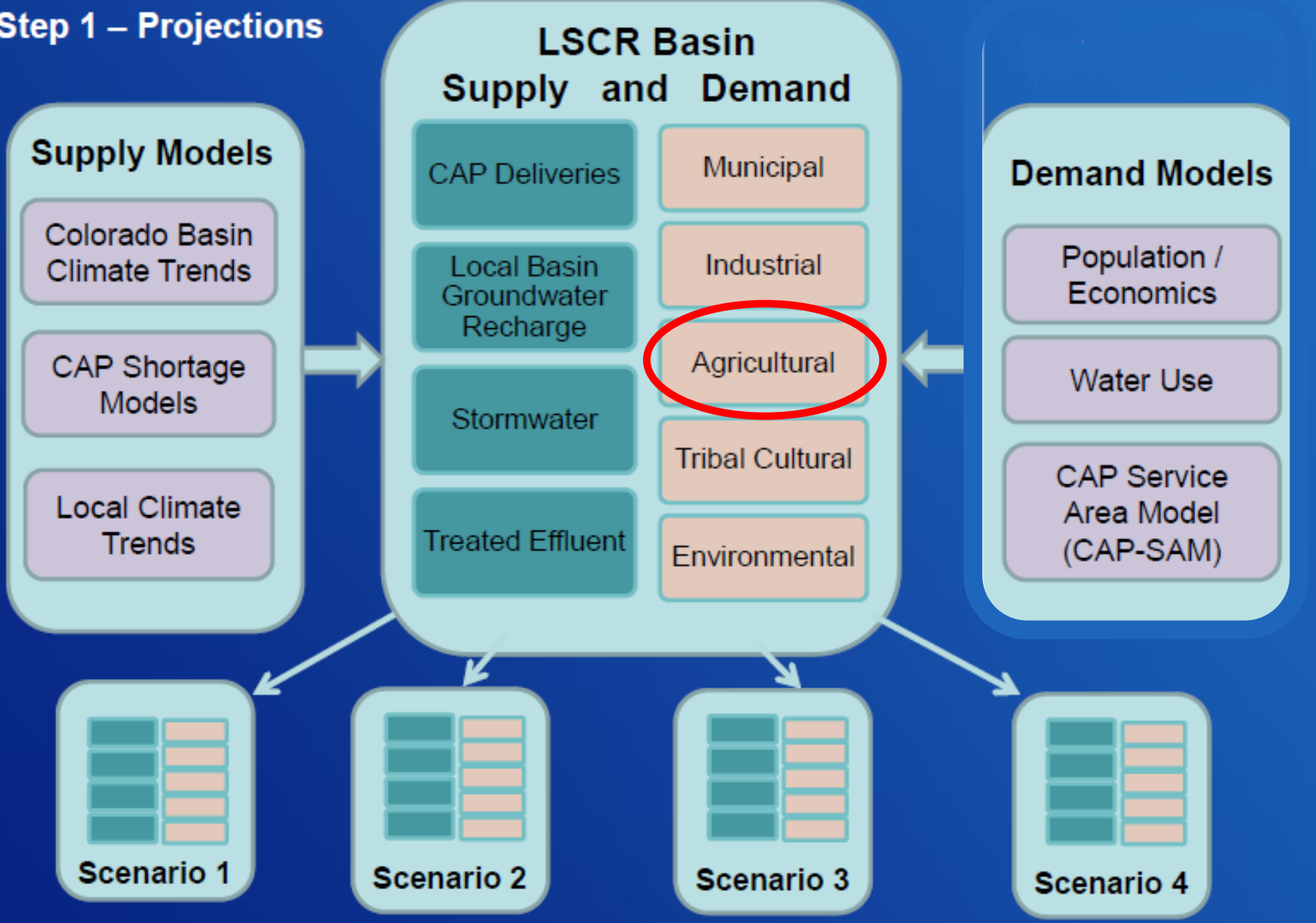
Step 1 – Projections



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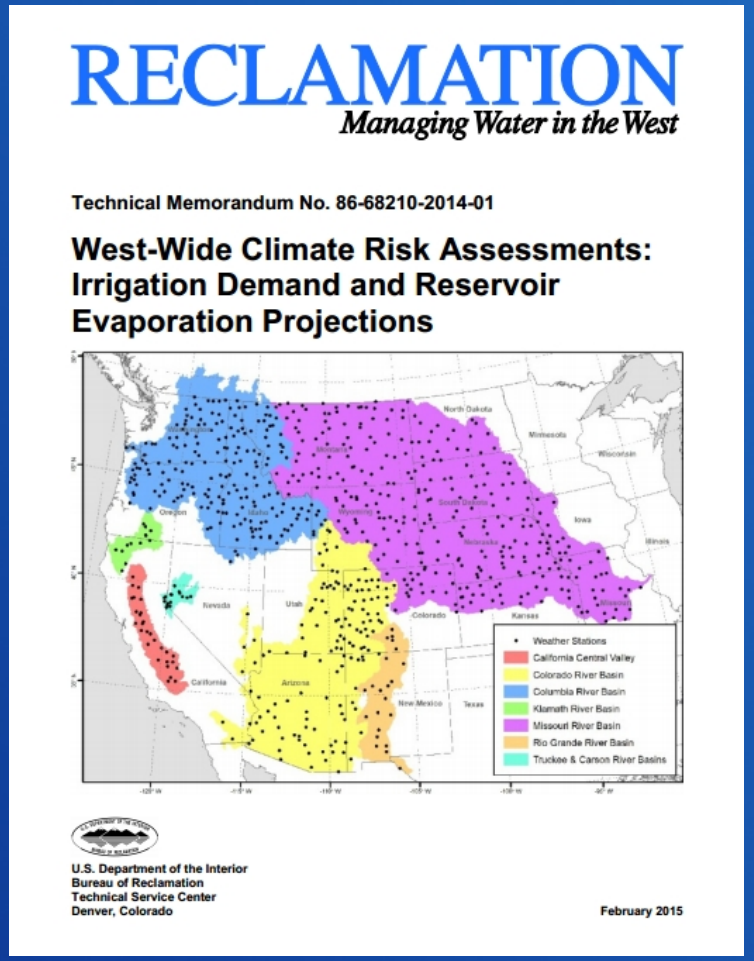
WWCRA – Irrigation Demand and Reservoir Evaporation Projections Report

http://www.usbr.gov/WaterSMART/wcra

- **CMIP-3 climate projections BCSD**
- **Irrigation demand (NIWR) for each HUC-8 across the West**
- **12-reservoirs across the West**
- **2020s, 2050s, 2080s**



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Technical Memorandum No. 86-68210-2014-01

West-Wide Climate Risk Assessments: Irrigation Demand and Reservoir Evaporation Projections

U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

February 2015

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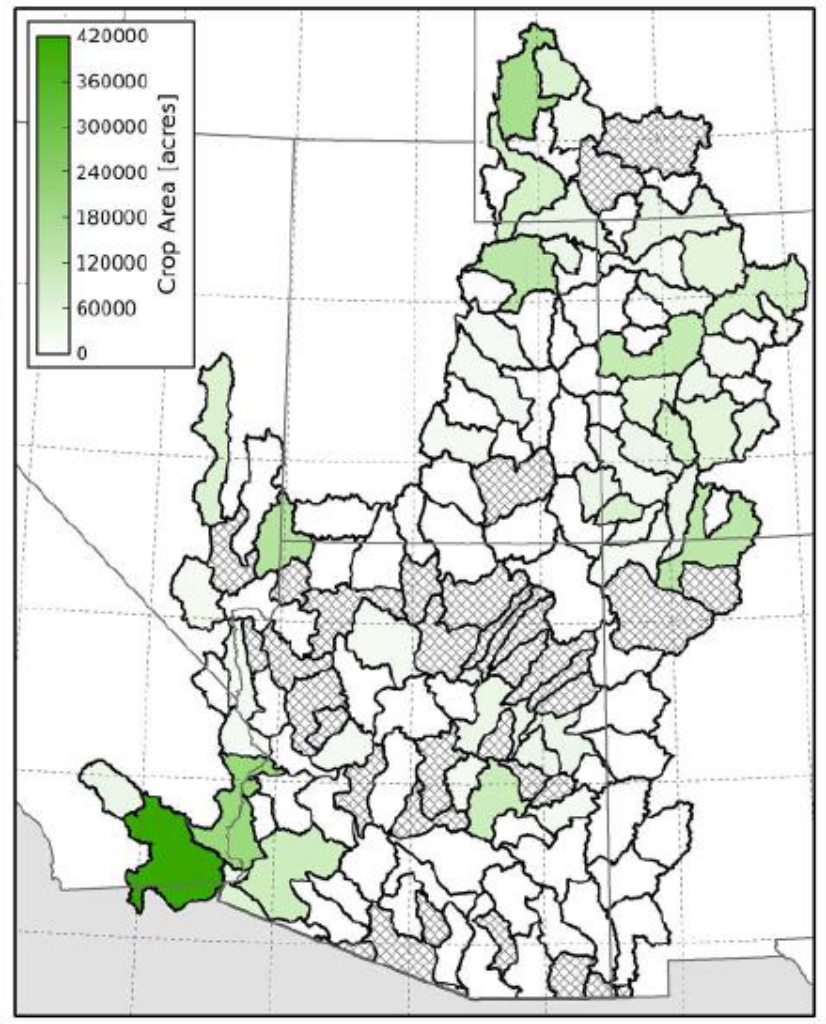
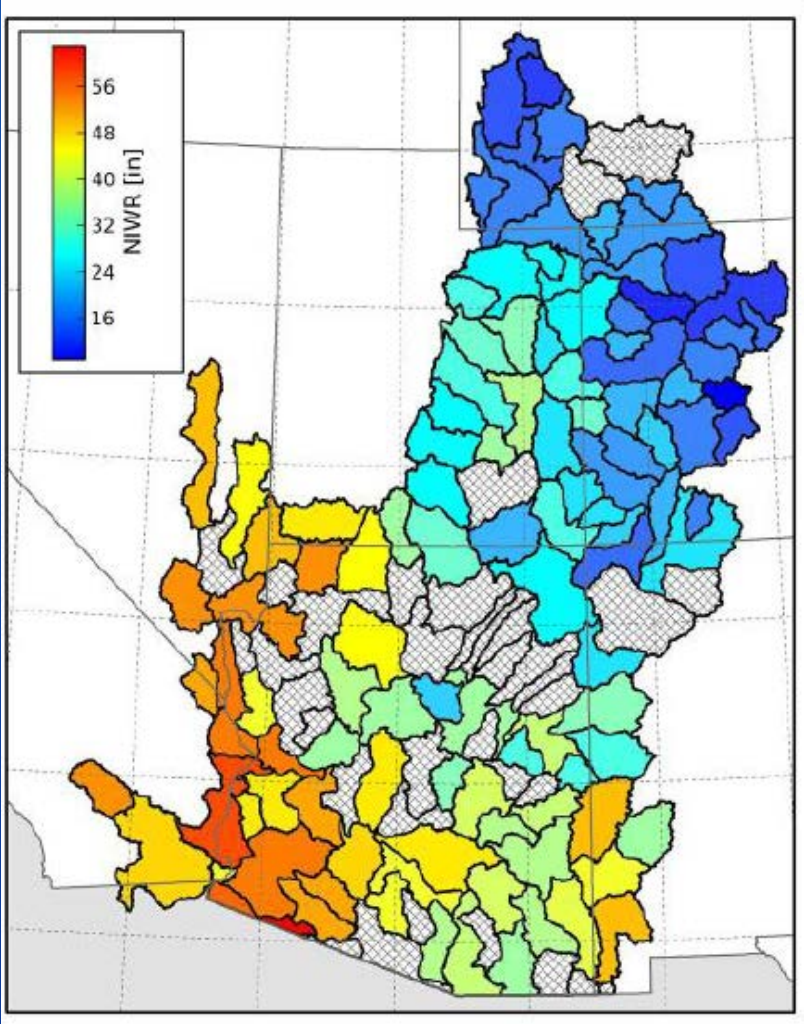
Crop Acreage and Net Irrigation Water Requirements – Baseline (1950-1999)





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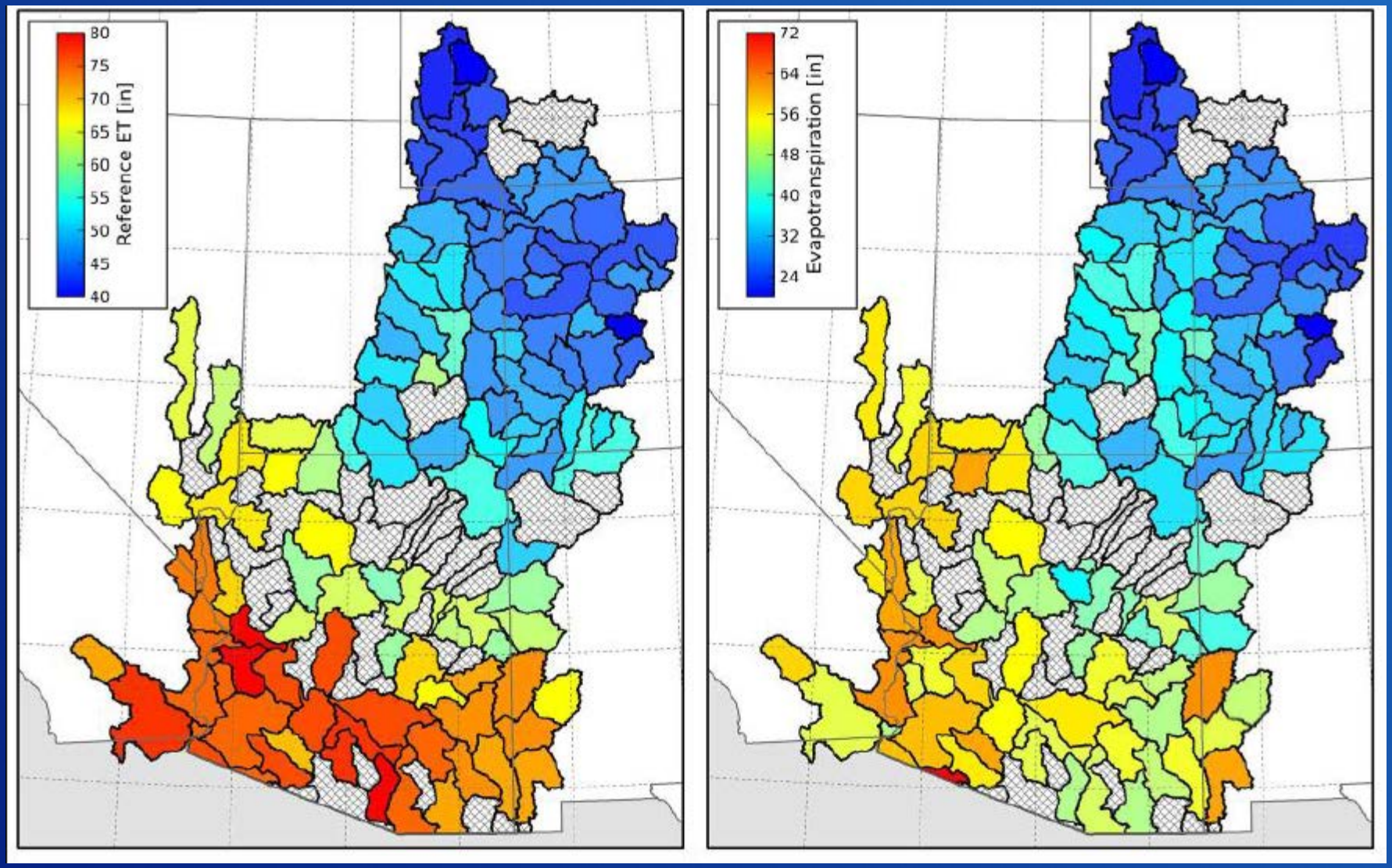
ET Estimation – Baseline (1950-1999)



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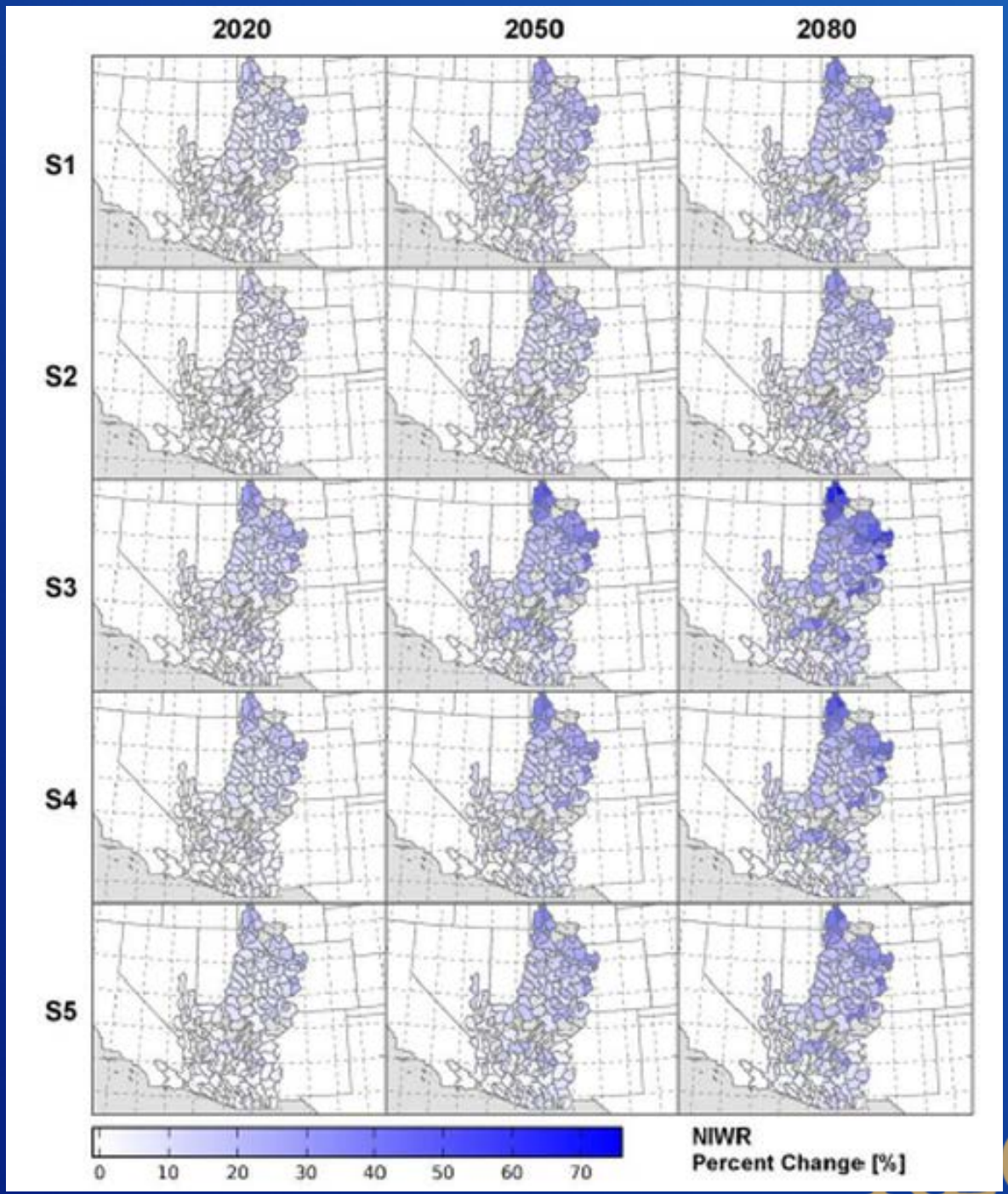

Climate Change Scenario Definitions

- S1=Warm-Dry (WD)
- S2=Warm-Wet (WW)
- S3=Hot-Dry (HD)
- S4=Hot-Wet (HW)
- S5=Central (CT)

(refer to later slide)

Example - Change in NIWR and Res. Evap.

	Net Irrigation Water Demand (Change % vs. 1950-1999)	Net Reservoir Evaporation (Change % vs. 1950-1999)
	2080	2080
Colorado River Basin *(AZ, CA, CO, NM, NV, UT, WY)*		
Upper Colorado	22.86	
Lake Powell		7.1 (4.1 inches)
Lower Colorado	8.31	
Lake Mead		10.1 (6.1 inches)
Imperial Valley	1.39	

http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=48726

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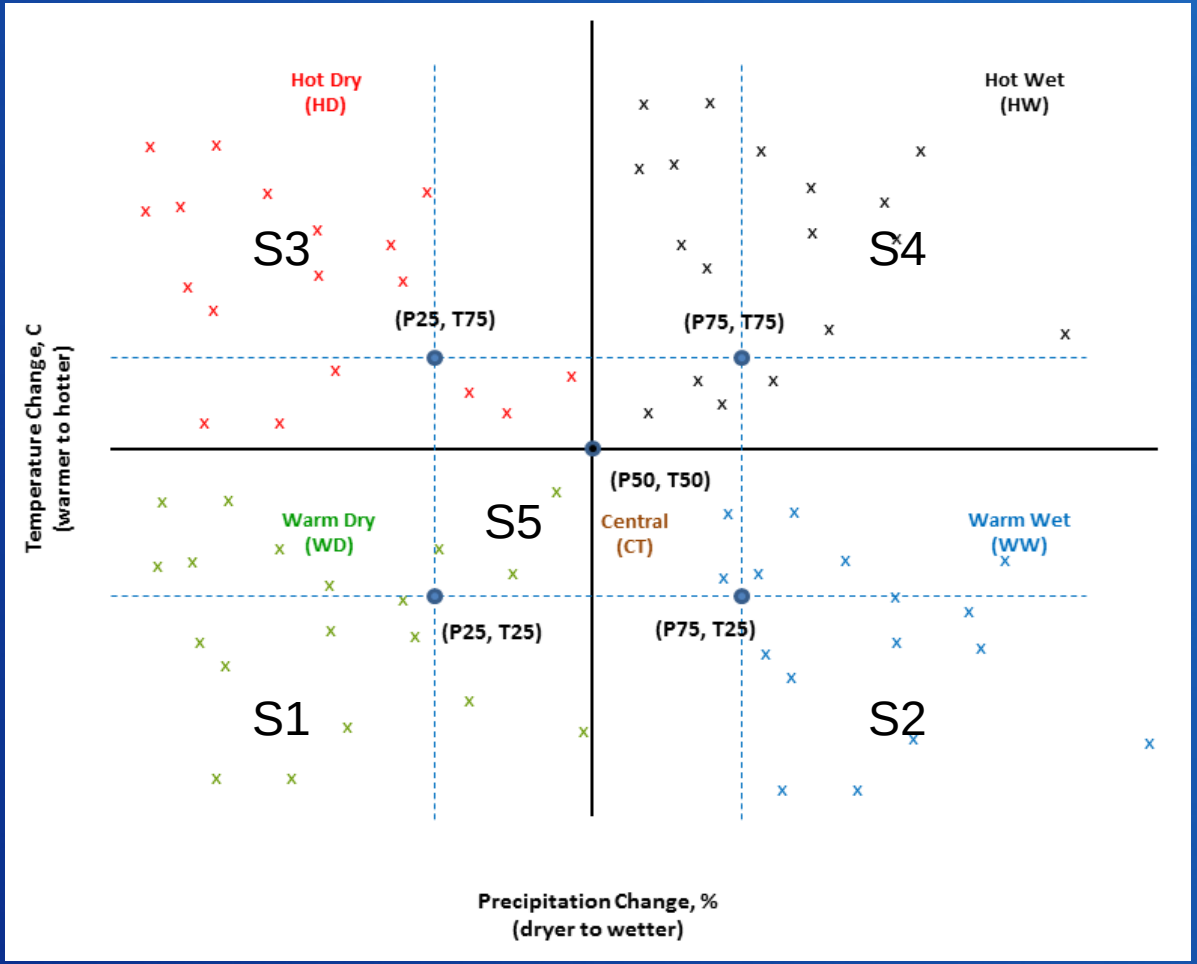
Meteorology and Climate

- 5 climate change scenarios utilizing ensemble informed hybrid delta (HDe) method for forcing crop ET model

- Warm, Dry (S1)
- Warm, Wet (S2)
- Hot, Dry (S3)
- Hot, Wet (S4)
- Central Tendency (S5)



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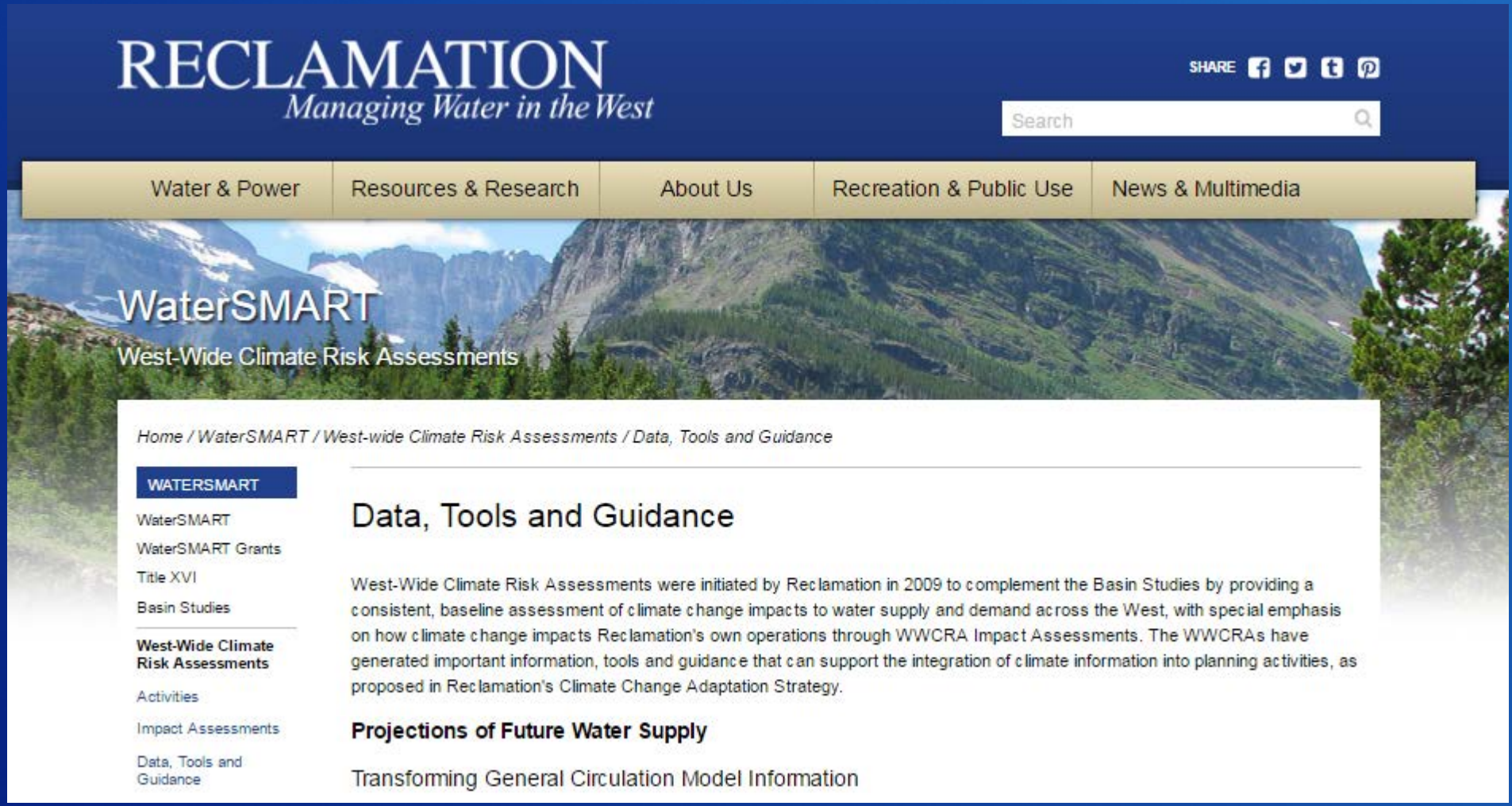
Data, Tools and Guidance
http://www.usbr.gov/watersmart/wcra/data.html



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Technical Guidance for Incorporating Climate Change Information into Water Resources Planning Studies

U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

September 2014

http://www.usbr.gov/watersmart/wcra/docs/WWCRATechnicalGuidance.pdf

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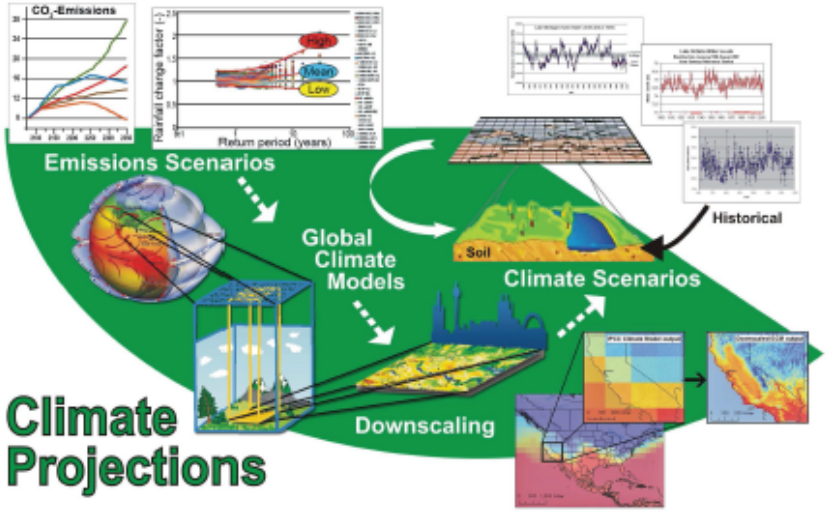
Considerations for Selecting Climate Projections for Water Resources, Planning, and Environmental Analyses



U.S. Department of the Interior
Bureau of Reclamation
Office of Policy

February 2016

http://www.usbr.gov/watersmart/wcra/docs/WWCRAClimateProjectionSelection.pdf

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Hydroclimate Projections

http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/dcpInterface.html

RECLAMATION NCAR USGS
Santa Clara University CLIMATE CENTRAL
SCRIPPS INSTITUTION OF OCEANOGRAPHY

Downscaled CMIP3 and CMIP5 Climate and Hydrology Projections

This site is best viewed with Chrome (recommended) or Firefox. Some features are unavailable when using Internet Explorer. Requires JavaScript to be enabled.

Welcome | About | Tutorials | Projections: Subset Request | Projections: Complete Archives | Feedback | Links

Downscaled CMIP5 climate and hydrology projections' documentation and release notes available here.

Summary

This archive contains fine spatial resolution translations of climate projections over the contiguous United States (U.S.) developed using two downscaling techniques (monthly BCSD Figure 1, and daily BCCA Figure 2), CMIP3 hydrologic projections over the western U.S. (roughly the western U.S. Figure 3), and CMIP5 hydrology projections over the contiguous U.S. corresponding to monthly BCSD climate projections.

Archive content is based on global climate projections from the World Climate Research Programme's (WCRP's) Coupled Model Intercomparison Project phase 3 (CMIP3) multi-model dataset referenced in the Intergovernmental Panel on Climate Change Fourth Assessment Report, and the phase 5 (CMIP5) multi-model dataset that is informing the IPCC Fifth Assessment.

For information about downscaled climate and hydrology projections development, please see the About page.

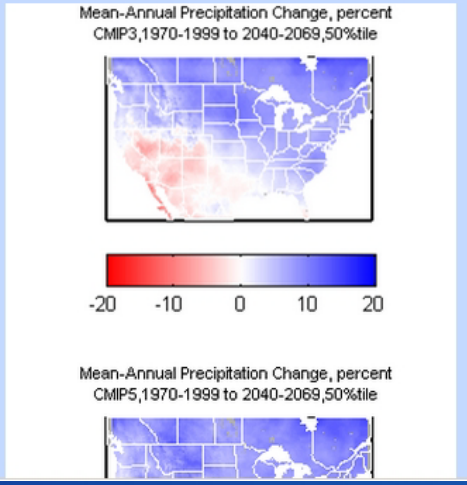
Purpose

The archive is meant to provide access to climate and hydrologic projections at spatial and temporal scales relevant to some of the watershed and basin-scale decisions facing water and natural resource managers and planners dealing with climate change. Such access permits several types of analyses, including:

- assessment of potential climate change impacts on natural and social systems (e.g., watershed hydrology, ecosystems, water and energy demands).
- assessment of local to regional climate projection uncertainty.
- risk-based exploration of planning and policy responses framed by potential climate changes exemplified by these projections.

Archive History

Figure 1. Central Tendency Changes in Mean-Annual Precipitation over the contiguous U.S. from 1970-1999 to 2040-2069 for BCSD3, BCSD5, and Difference.



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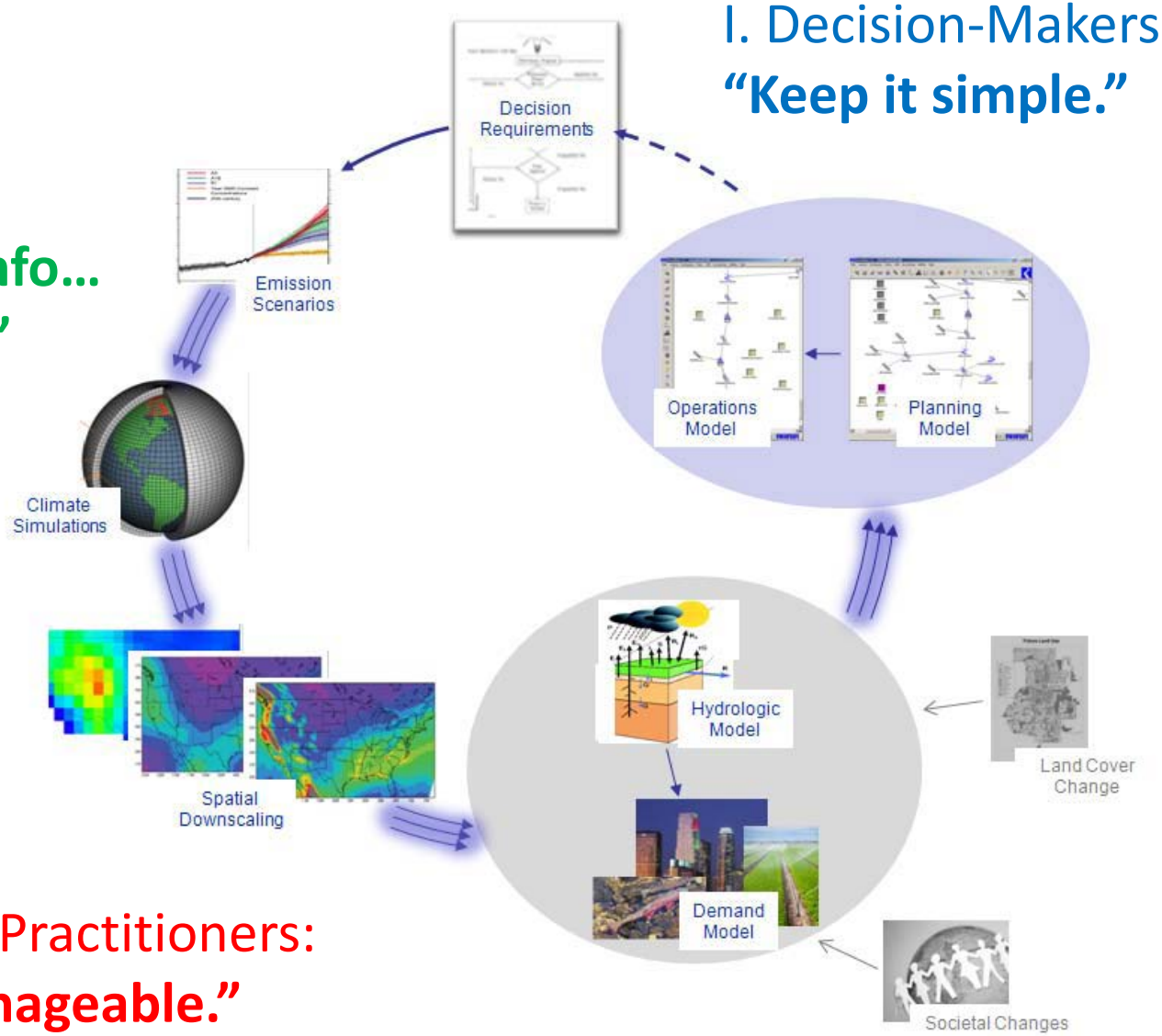
In summary, data selections and method choices are throughout the analysis…

II. Climate Information Providers:
"Here's the info… use it wisely."

I. Decision-Makers:
"Keep it simple."



III. Technical Practitioners:
"Keep it Manageable."

… choices carry uncertainties, we need to understand those uncertainties, and address them in the planning process .